(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 585 982 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93201230.5**

(51) Int. Cl.5: **A43D 23/02**, A43D 119/00

(22) Date of filing: **29.04.93**

(30) Priority: **04.09.92 IT MI922065**

(43) Date of publication of application:
09.03.94 Bulletin 94/10

(84) Designated Contracting States:
DE FR GB IT

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(54) Apparatus for folding the edge of a vamp on the last of a shoe-making machine.

(57) The apparatus described includes a pair of plates (10) pivotable like jaws about a common centre of rotation (C), means (16) for supporting and guiding the plates, means (21, 15, 22) for adjusting the angles of orientation of the plates, drive means (23, 23a) for moving the plates (10) and their respective support and guide means (16) from a rest position remote from the last to a working position in which the inner edges (12a) of the plates (10) interact with the vamp on the last (30). In order to adjust the orientation of the plates within a wide range independently of the movement from the rest position to the working position, the means (21, 15, 22) for adjusting the angles of orientation of the plates (10) include a motor (21) for each plate (10) and kinematic coupling members (15, 22) for coupling the motor to the respective plate. A programmable control unit is also provided for operating the motors (21) for the plates (10) and the drive means (23, 23a) independently to orient the plates at predetermined angles and to move them with their respective support and guide means through a predetermined distance.

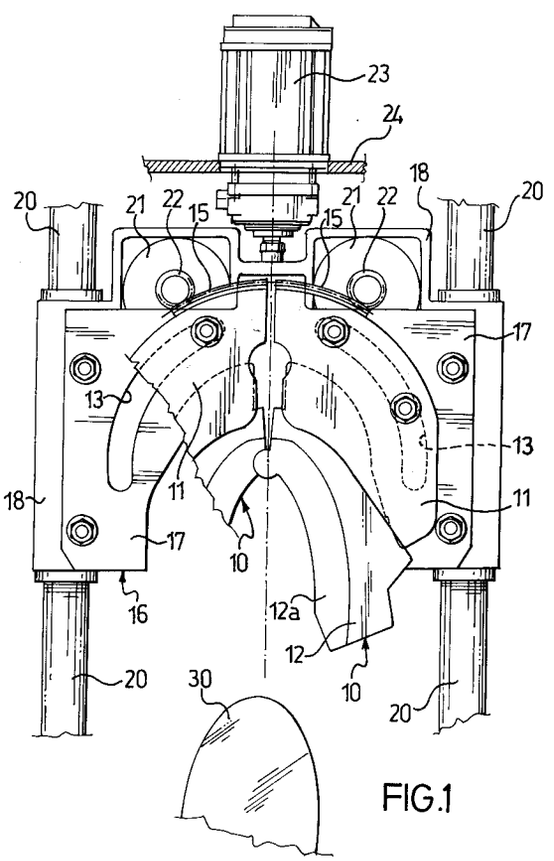

FIG.1

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The present invention relates to machines for manufacturing shoes and, in particular, to apparatus for folding the edge of a vamp on a last so that the edge of this vamp may be glued to a support sole arranged on the last.

Machines are known that carry out various stages in the assembly of the front part of a shoe on a last. A machine of this type, together with an assembly procedure, is described, for example, in the Italian patent No. 912328 held by the present applicant.

The basic stages in the manufacture consist in arranging the vamp on the last to which a support sole or insole has been fixed in readiness, in grasping the edges of the vamp with a plurality of pincers mounted around the last, in stretching the vamp on the last by relative movement of the last and the pincers, in clamping the vamp on the last by means of a semi-annular member which exerts pressure on the edge of the last, in gradually loosening the grip of the pincers on the edge of the vamp, in folding the edge of the vamp under the last by means of two movable shaped plates and in pressing the edge of the vamp onto the sole by means of the plates thereby sticking the vamp to the sole with glue previously applied between the two parts.

One acutely felt requirement in this type of manufacture is an ability to switch rapidly from assembling footwear of a given style and size to assembling footwear of another style or size, or from assembling right shoes to assembling left shoes. A change of this kind involves modifying the attitude, the position and the configuration of various members and devices of the machine. In particular, the plates must be adaptable by adjustment of the profiles of their inner edges so that these edges correspond as closely as possible to the front part of the shoe to be assembled.

In prior art devices for folding the edges of a vamp, the plates are pivoted about a common centre of rotation like jaws and are moved in a direction longitudinally of the shoe from a rest position, at a certain distance from the last, to a working position in which their inner edge interacts with the last. During this movement, the two plates move from an open position to a closed position thanks to the action of appropriate cams, the profiles of which determine their relative orientation.

With prior art devices it is not possible to modify the closing movements and angles except by replacing the cams with others having a different shape, that, is by a somewhat laborious operation which must, of course, be carried out with the machine stopped and therefore at the expense of productivity.

Apparatus for folding the edge of a vamp is also known in which the initial orientation of the plates may be set by means of rods of variable length which may be adjusted when the machine itself is adjusted to adapt it to a particular style or size of shoe to be assembled. In this case also, adjustment takes quite some time and, in any case, permits only a modest range of adjustment.

In any case, with prior art devices, the angles of closure of the plates are linked strictly to the path of approach of the plate-bearing assembly to the last, which makes adjustment somewhat complicated.

The object of the present invention is to provide an apparatus for folding the edge of a vamp on a last in which the orientation of the plates may be adjusted within a wide range and is independent of the movement from the rest position to the working position.

This object is achieved by the apparatus according to the invention as defined and characterised in the first of the claims which follow this description.

The invention will be better understood from the following detailed description of one embodiment, given by way of example and therefore in no way limitative, with reference to the appended drawings, in which:

Figure 1 is a schematic view from above of apparatus according to the invention;

Figure 2 is a side view of the apparatus of Figure 1 with some parts sectioned, and

Figures 3 and 4 are views similar to that of Figure 1, on a reduced scale, showing two possible operating conditions of the apparatus according to the invention.

With reference in particular to Figures 1 and 2, two plates, generally indicated 10, are pivotably coupled together like jaws for rotation about a common centre C. Each plate 10 has a support part 11, constituted by two elements 11a and 11b (Figure 2), and an interchangeable part 12 arranged between the two elements 11a, 11b. This part 12 is fixed mechanically to the support part 11 by appropriate fixing means, not shown, and may be replaced, in known manner, in order to adapt the machine as necessary to the manufacture of a broad range of styles. The interchangeable part 12 has an inwardly tapered edge 12a defined by a curve which substantially follows the profile of the last and therefore of the shoe to be assembled. Part of the last is shown schematically only in Figure 1 where it is indicated 30. The plates 10 are mounted on support and guide means, generally indicated 16, which include a base element 17 and a support structure 18 slidable on two parallel guides 20. The base element 17 has two part-circular slots 13, centred on the point C, into which two pairs of guide pins 14 fixed to the support parts 11 of the plates are inserted. Each of the

parts 11 has a rack 15 along part of its outer edge, extending through an arc of a circle having its centre at the point C.

Two electric motors 21 are mounted on the support structure 18 and pinions 22 splined to their respective shafts engage the racks 15. An electric motor 23, only partly shown in the drawings, is fixed to the base of the machine indicated at 24 and coupled to the structure 18 by means of a recirculating-ball screw of which part of the screw is visible in Figures 3 and 4 and indicated 23a. The guides 20 are also fixed to the base of the machine by means, not shown, so that the starting of the motor 23 causes the entire plate-support assembly to move on the guides thereby moving the plates 10 from a rest position remote from the last, when the screw is retracted, to a working position on the last when the screw is extended.

Both the electric motor 23 and the electric motors 21 are connected through appropriate connection and control means to a control unit, for example a programmable electronic unit, so that they may be operated by the unit independently of each other according to a predetermined programme. In particular, the plates 10 are pivoted by their respective motors 21 so that, in their working positions, they are oriented at predetermined angles so as to follow the profile of a shoe of a particular style or size. The orientation of the plates is normally adjusted while the entire plate-support assembly is being moved forwards from its rest position to its working position but it can also be adjusted before the assembly is moved. The forward movement is, of course, also programmed according to the position of the last 30. Figures 3 and 4 show two possible working situations. Both the programmable control unit and the relative connection and control apparatuss of the motors are known to experts in automatic control systems and it is not therefore necessary to describe them.

It is easily seen that the object of the invention is fully achieved. In fact, thanks to the independent and programmed control of the motors, the path and the final position of the plates may be perfectly and automatically adjusted to any style or size whatever of shoe to be assembled. In addition, this adjustment may be carried out very rapidly simply by supplying the control unit with data relating to the shoe to be assembled so that the machine's versatility and productivity are greatly increased over those of prior art machines.

Although only one embodiment has been described and illustrated, it is clear that numerous variants and modifications are possible within the scope of the same inventive concept. For example, in order to advance the plates, a hydraulic motor and an appropriate coupling between the motor and the plate-support assembly could be used instead of the motor 23; for the kinematic coupling beteen the motors and the plates, other members capable of fulfilling the same function could be used instead of the pinions and racks.

Claims

1. Apparatus for folding the edge of a vamp on a last in a machine for manufacturing shoes, the apparatus including

a pair of plates (10) pivotable like jaws about a common centre of rotation (C) and having inner edges (12a) shaped so as to interact with the vamp on the last (30),

means (16) for supporting and guiding the plates,

means (21, 15, 22) for adjusting the angles of orientation of the plates,

drive means (23, 23a) for moving the plates (10) and their respective support and guide means (16) from a rest position remote from the last to a working position in which the inner edges (12a) of the plates (10) interact with the vamp on the last (30), and

a control unit for controlling the means for setting the angles and the drive means,

and characterised in that the means (21, 15, 22) for adjusting the angles of orientation of the plates (10) include a motor (21) for each plate and kinematic coupling members for coupling the motor and to the plate and in that the control unit includes programmable means arranged to operate the motors (21) for adjusting the angles of the plates (10) and the drive means (23, 23a) independently so that the plates may be oriented at predetermined angles and moved, together with their respective support and guide means (16), through a predetermined distance.

2. Apparatus according to Claim 1, characterised in that the means (16) for supporting and guiding the plates (10) include a base element (17) having a slot (13) for each plate in the form of a circular arc centred on the centre of rotation (C) and at least one pin (14) fixed to the respective plate (10) for engagement in the slot (13).

3. Apparatus according to Claim 1 or Claim 2, characterised in that the members for kinematically coupling a motor (21) to a plate (10) include a pinion (22) splined to the motor shaft and a rack (15) fixed to the plate (10).

4. Apparatus according to any one of the preceding Claims, characterised in that each plate (10) includes a support part (11) and an inter-

changeable part (12) shaped so that its inner edge (12a) substantially corresponds to the profile of the last (30).

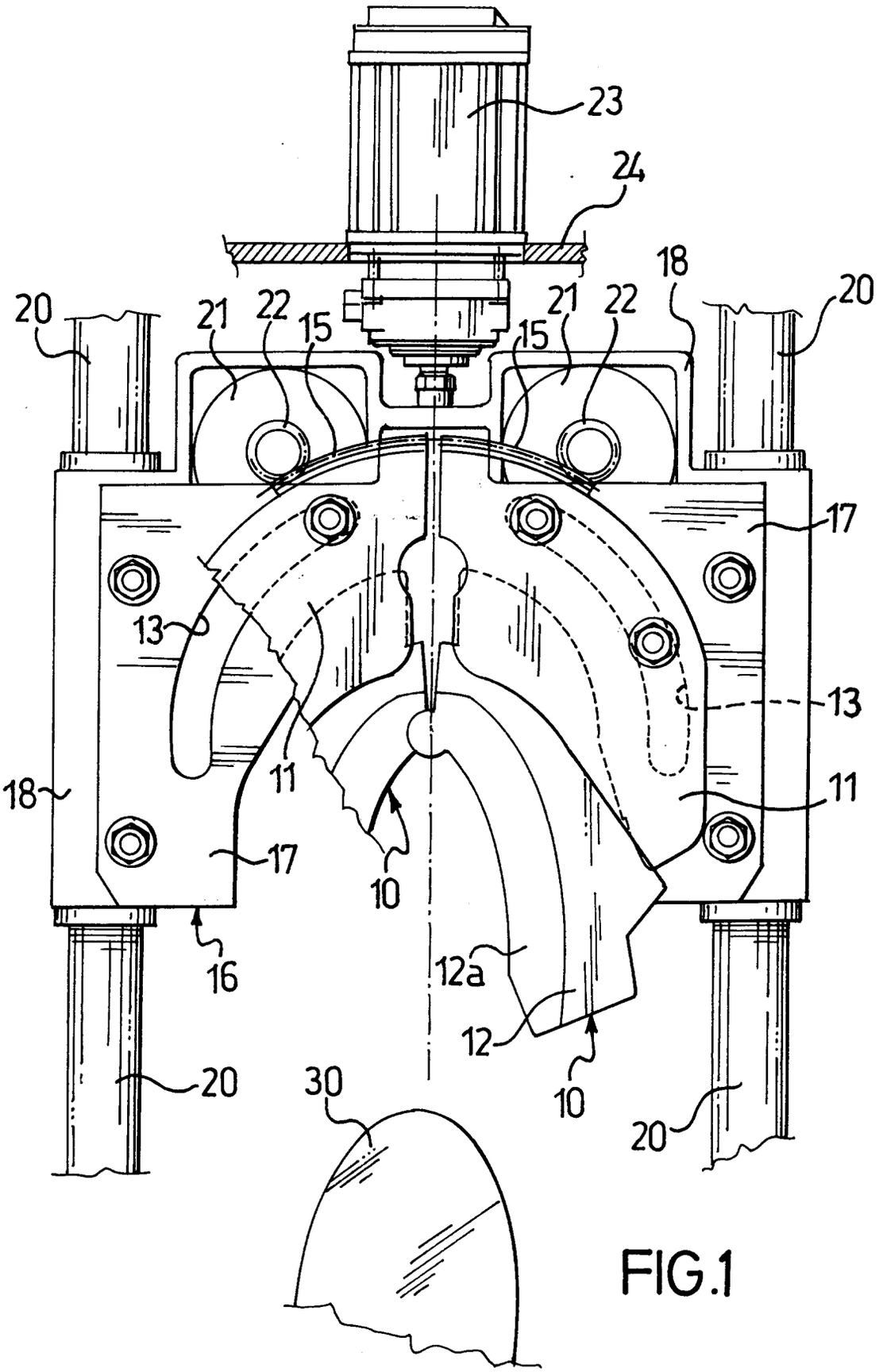
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FIG.1

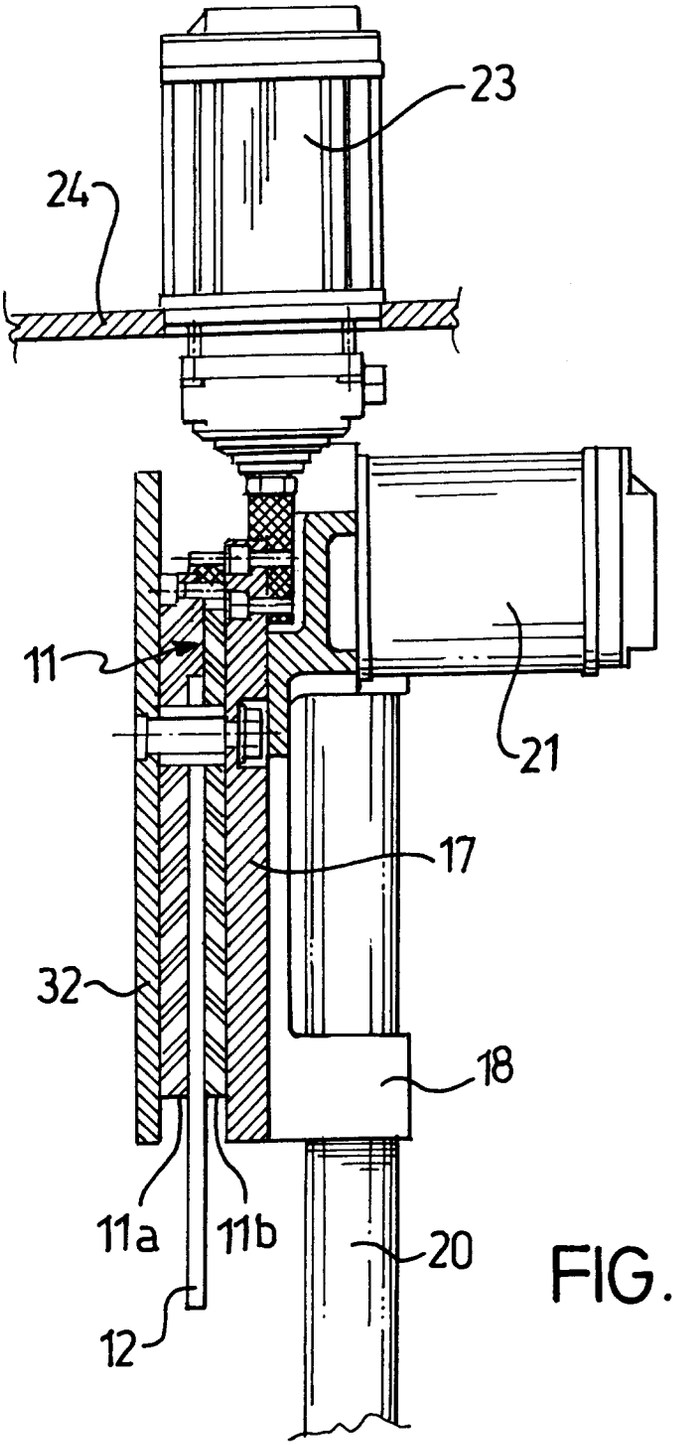

FIG.2

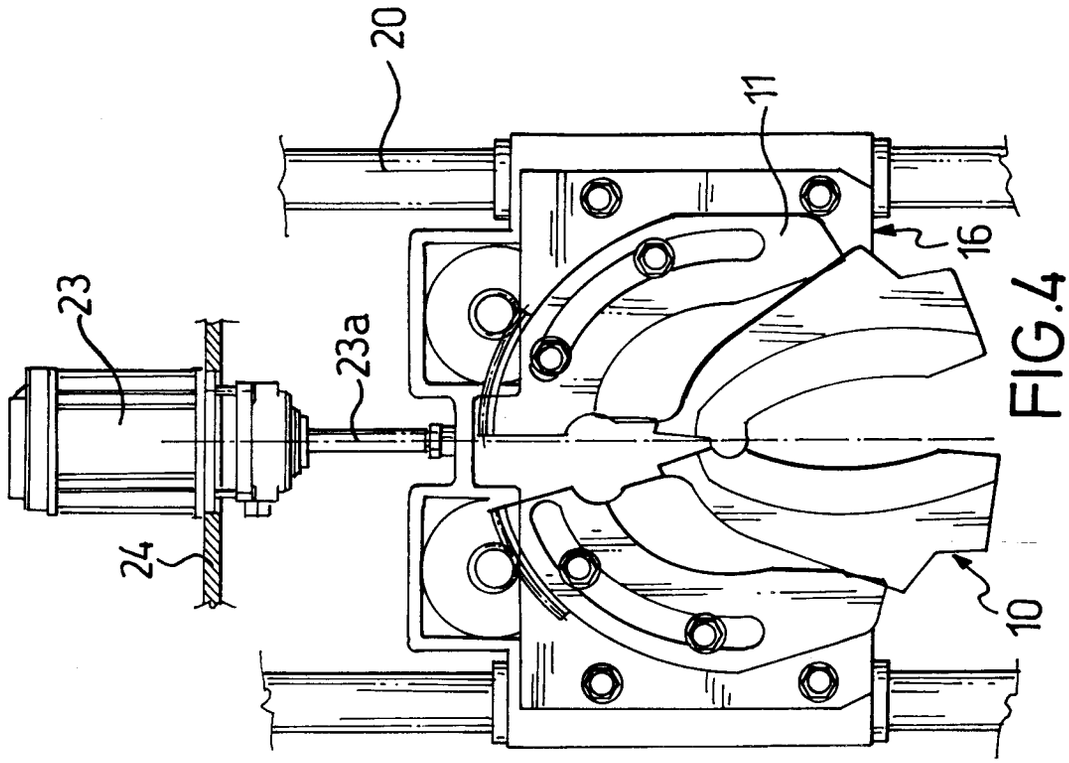

FIG.4

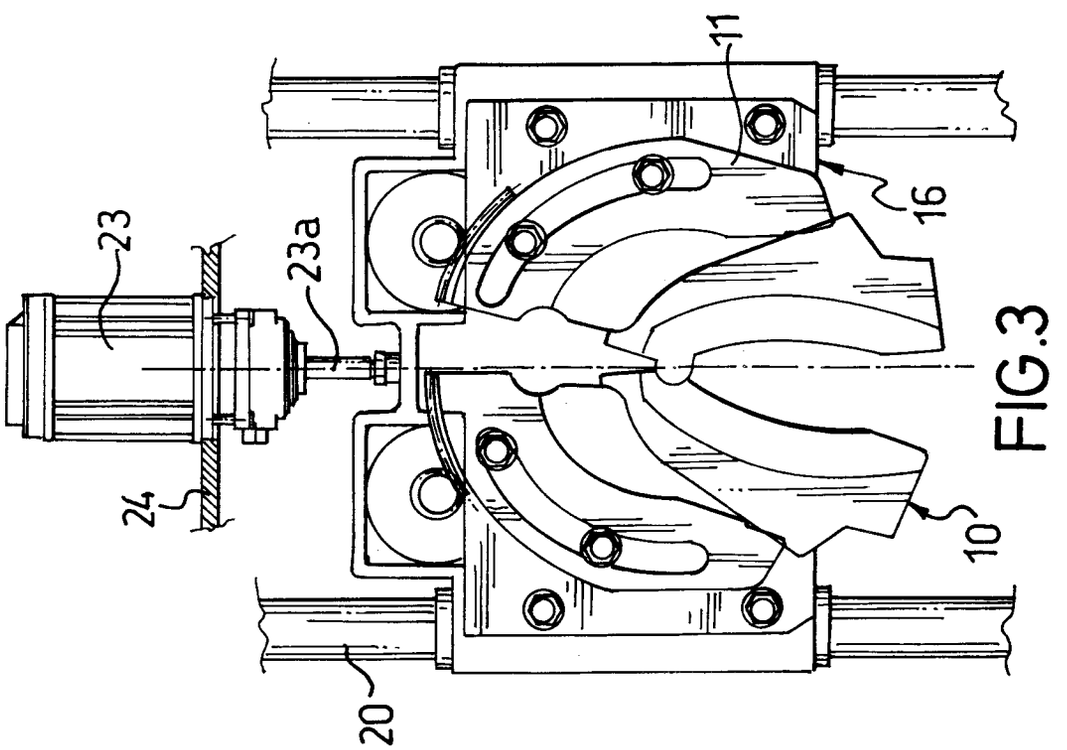

FIG.3

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EUROPEAN SEARCH REPORT

Application Number

EP 93 20 1230

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-3 806 087 (HACOBA TEXTILMASCHINEN GMBH & CO KG) * column 1, line 1 - line 15 * * column 1, line 59 - column 2, line 14 * * column 2, line 32 - line 39 * * column 2, line 55 - line 64; claims; figure 3 *	1-4	A43D23/02 A43D119/00
X	EP-A-0 338 722 (BRITISH UNITED SHOE MACHINERY LTD.) * abstract * * page 3, column 3, line 30 - line 52; claims; figure 2 *	1-4	
A	US-A-3 083 384 (PETER L. DE PESA)		
A	US-A-3 155 994 (HARRY L. DENT)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A43D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 SEPTEMBER 1993	SOEDERBERG J.E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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